Rebuild Massachusetts

REBUILD MASSACHUSETTS

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INSIDE THIS ISSUE

A MASSACHUSETTS DIVISION OF ENERGY RESOURCES REBUILD AMERICA PROGRAM

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MAVERICK GARDEN

Sustainable, Affordable Housing – One Year Later

The goal of this project is to find a reasonable standard for energy efficient, healthy, affordable housing in Boston. Guided by LEED standards, the development aggressively pursues energy savings.

The building received significant financial and technical support from US DOE, the Massachusetts Technology Collaborative (MTC), US HUD, and utility system benefit charge energy efficiency programs to "*green*" the building and make it significantly more durable and energy efficient.

In August 2005, Rebuild Massachusetts requested US DOE National Laboratory technical support to assist with the analysis of Maverick Gardens.

MAVERICK GARDENS

Significant energy modeling (DOE-2) was performed as part of the design and construction process. Most of the primary equipment (PV system, 60 kW gas-fired cogeneration system, and Broad absorption chiller/ boiler) have online real time monitoring capability. Additionally, the common electric, gas, and water meters are available online and each apartment's electric meter is read manually each month.

In anticipation of a formal presentation at the Build Boston Conference in November, Rebuild Massachusetts requested the technical assistance to true up the initial DOE 2 modeling against 10-12 months of actual energy consumption to confirm the actual performance of the building. We also requested technical assistance to assess and recommend the most cost effective operation of the multiple pieces of equipment installed in the building. Currently each piece of equipment operates independently (by the service contractors) with limited analysis of the cost ramifications of the operating schedule.

The initial presentation about the building design at Build Boston 2004 was well attended by local architects. The 2005 session focused on the actual building performance - *are all the pieces working as designed.* This highlights the high performance energy efficiency and renewable energy characteristics of this building with detailed performance documentation that is either extremely expensive or otherwise difficult to collect in most buildings. The simplified summary of the request was that operating data at the utility and component level be used to calibrate DOE-2 analyses completed on the building in the design phase, with further refinement completed in September and October.

Rebuild Massachusetts activities in September and October consisted of onsite technical support and Build Boston presentation preparation. ***Bing Liu***, of Pacific Northwest National Laboratory (PNNL), has been actively working with ***John Snell*** of Peregrine Energy Group (Rebuild Massachusetts technical partner). Onsite support included project coordination, utility data collection, apartment temperature, humidity, and electric use monitoring. In addition, Rebuild Massachusetts developed installation specifications for an energy management system software upgrade to track the performance of the mechanical systems and a current transformer replacement to measure the building's real time electrical use. Rebuild Massachusetts collected, analyzed, and summarized the building's performance for a presentation at Build Boston by Maverick Garden design/ development team led by ICON Architecture. Preliminary PNNL analysis was done in October – a more thorough analysis will be completed in the spring of 2006.

Click here to view the presentation

FINDING MONEY FOR ENERGY EFFICIENT PROJECTS

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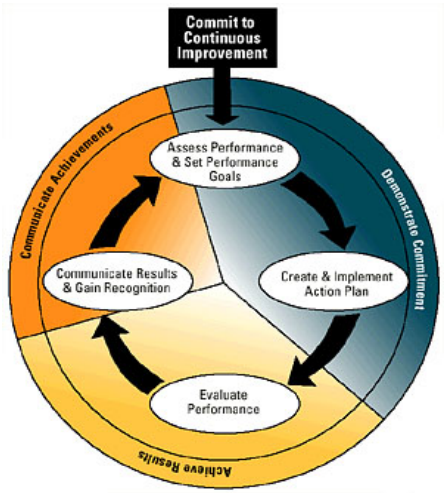
In today's economic environment, most public sector organizations face increasingly tight operating and capital budgets, challenging facility managers to do more with less.

Meanwhile, maintenance and infrastructure needs continue to grow.



Maintaining an energy-efficiency budget requires constant evaluation and communication

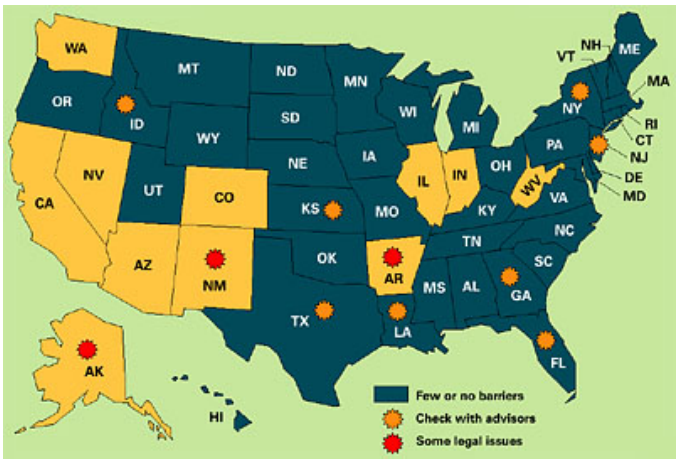
The utility budget can be viewed as a source of funds for making improvements. The U.S. Environmental Protection Agency's (EPA) Energy Star program estimates that up to 30% of the dollars spent on energy every year are wasted because of system inefficiencies. These wasted funds can be used to help pay for much needed improvements.

Financial barriers to energy conservation measures often include some common ***misconceptions***:

- No budget line
- Equipment improvements paid from the capital budget.
- Paying lower interest (by floating bonds) or no interest (by delaying the project and planning it into future budgets) saves more money.
- Increased taxes or fees pay for these improvements.
- Performance contracting with an energy service provider (ESP) is expensive and unreliable.
- Tax-exempt lease-purchase agreements do not lend themselves to energy projects and are expensive alternative funding solutions.

Success Stories

Many public entities have worked through their financial hurdles to implement energy-efficiency upgrades. For example, when Brooklyn College (part of the City College of New York) officials realized they had insufficient funds to install the needed equipment, they chose a lease-purchase agreement performance contract and spent the dollars they anticipated saving from future operating budgets. As no capital budget commitment was necessary, the college purchased and installed the energy-efficient equipment right away.



Status of Performance Contracting in Individual States

State of New Hampshire officials insisted on minimizing any impact on the state's bond (credit) ratings while implementing energy-efficiency improvements. After careful study, state officials settled on a master lease program that financed energy-efficiency upgrades using the dollars saved from future utility bills.

The officials in the following examples found that using performance contracts with reputable energy service providers (ESCOs) offered the best, most cost-effective solution for financing energy efficient capital upgrades. Other public agencies undertaking similar energy efficiency projects include:

- Pennsylvania’s Allegheny County turned to performance contracting when its capital budget shrank by 20%.
- Mississippi, Virginia, and Maryland initiated statewide Energy Efficiency Master Lease Programs (MLPs).
- Florida's Miami-Dade County School District added energy efficiency projects to an existing lease-purchase Certificates of Participation (COPs) program as the lowest cost alternative.
- The Town of Belmont, Massachusetts is implemented energy saving measures at all six public schools, an ice skating rink, the police department headquarters and several other public facilities. Projected annual savings from the conservation measures are expected to be $200,000.

Operating versus Capital Expenses

	Cash	Bonds	Municipal Lease	Performance Contracts
Interest Rates	**N/A**	**Lowest tax-exempt rate**	**Low tax-exempt tare**	**Can be taxable or tax-exempt**
Financing Terms	**N/A**	**May be 20 years or more**	**Up to 10 years is common: up to 12-15 years possible**	**Typically up to 10 years; may be as long as 15 years depending on project**
Other Costs	**N/A**	**Underwriting legal opinion, insurance, etc.**	**None**	**May have to pay engineering costs if contract not executed**
Approval Process	**Internal**	**May need approval by tax payers or public referendum**	**Internal approvals needed. Simple attorney letter required**	**RFP usually required, internal approvals needed**
Approval Time	**Current budget period**	**May be lengthy, process may take years**	**Generally within one day**	**Generally within 2-3 days once award is made**
Funding Flexibility	**N/A**	**Very difficult to go above the dollar ceiling**	**Can set up a Master Lease, which allows you to draw down funds as needed**	**Relatively flexible. An underlying Municipal Lease is often used**
Budget Used	**Either**	**Capital**	**Operating**	**Operating**
Largest Benefit	**Direct access if included in budget**	**Low interest rate because it is a general obligation of the public entity**	**Allows you to buy capital equipment using operating dollars**	**Provides performance guarantees, which help approval process**
Largest Hurdle	**Never seems to be enough money available for projects**	**Very time consuming**	**Identifying the project to be financed**	**Identifying the project to be financed and selecting the ESCO**

Before implementing energy-efficiency improvements, analyze each financing method to realize maximum savings.

The disadvantages of using the capital expense budget for energy-efficiency projects include:

- Capital dollars are often already committed to other projects
- Capital dollars are usually scarce, so your projects are competing with others
- The approval process for requesting new capital dollars is time consuming, expensive, and typically requires voter approval

Energy-efficiency projects are different from most other capital projects in one crucial way: the source of repayment is already in the utility line item of your operating budget -- you just need to redirect the money to a third party. Some utilities, like Xcel Energy in Minnesota and Colorado, offer customers "on-the-bill-financing" to take advantage of this distinction.

Performance Contracts

In many parts of the United States, performance contracting is a common way to implement energy-efficiency improvements. Performance contracts frequently cover financing for the new equipment, if internal funds are not used. Properly structured performance contracts can be treated as an operating expense.

Common financing options under a performance contract include:

- ESCO-based financing
- Tax-exempt lease-purchase agreements

A facility manager can overcome time and expertise barriers by outsourcing the work to qualified, reputable energy service providers using a performance contract. Under such a contract, the ESCO insures that the actual energy savings will match the projected savings, and the contract identifies the procedures by which these savings are measured and verified. In a guaranteed savings agreement (GSA) – the most popular type of performance contract used in the public sector – the ESCO or an insurance company, which agree to reimburse the sponsoring organization for any shortfalls, guarantees the energy performance of the equipment. A GSA bundles equipment purchasing and performance guarantees; it may also include financing, energy costs, and maintenance. While ESCOs usually borrow at taxable interest rates, public agencies are able to issue lower cost tax-exempt obligations. As a result, GSAs usually incorporate tax-exempt lease-purchase agreements as the underlying financing instrument.

Tax-Exempt Lease-Purchase Agreements

Tax-exempt lease-purchase agreements are the most common public sector financing alternatives to traditional debt financing (bonds, loans, etc.), allowing a public organization to pay for energy upgrades with money already set aside in its annual utility budget. When properly structured, this financing mechanism draws on dollars saved from future utility bills to pay for new, energy-efficient equipment today.

A tax-exempt lease-purchase agreement, also known as a municipal lease, is like an installment-purchase agreement rather than a commercial rental agreement because the equipment ownership transfers to the lessee. Interest rates are appreciably lower than rates on a taxable commercial lease-purchase agreement because the interest paid is exempt from federal income tax for public sector entities. In addition, a tax-exempt lease-purchase agreement usually does not constitute a long-term "debt" obligation because of the non-appropriation language written into the agreement. This language limits the payment obligation to the organization's current operating budget period. If future funds are not appropriated, the equipment is returned to the lender, and the repayment obligation is terminated at the end of the current operating period without placing any obligation on future budgets.

Public organizations should consider using a lease-purchase agreement to pay for energy efficiency equipment when the projected energy savings will be greater than the cost of the equipment plus financing--especially when a reputable energy service provider guarantees the savings. Decision makers do not need to worry about exceeding operating budgets because the lease payments can come from the dollars saved on current utility bills once the energy-efficiency equipment is installed. The financing terms for lease-purchase agreements are usually less than 10 years and limited by the useful life of the equipment.

Debt Defined

Debt can be interpreted from three perspectives--legal, credit rating, and accounting. Because of the non-appropriation language typically in tax-exempt lease-purchase agreements, most of these agreements are not considered legal debt, which may eliminate the need for local voter approval. However, credit rating agencies, such as Moody's and Standard & Poor's, do include some or all of the lease-purchase obligations when they evaluate a public entity's credit rating and its ability to meet payment commitments ("debt service"). These two perspectives (legal and credit rating) may, in turn, differ markedly from the way lease-purchase agreements are treated by your own accounting department (i.e., which budget is charged) and your organization's external auditors.

In general, lease-purchase payments on energy-efficiency equipment are small compared to the total operating budget of a public organization. This means that the accounting treatment of such payments may be open to interpretation. Organizations recognize that energy savings cannot occur if the energy-efficiency projects are not installed. As such, the projects' lease-purchase costs (the financing costs for upgrades) can be paid out of the savings in the utility budget. Outside auditors, however, may take exception to this treatment if these payments are considered material from an accounting perspective. Determining when an expense is "material" is a matter of the auditor's professional judgment. As a practical guide, a charge could be considered material when it equals or is greater than 5% of the total operating budget. Energy budgets for typical school districts are around 2%; therefore, energy-efficiency improvements will rarely be considered material.

Know State Rules

Many public entities already lease something (copiers, school buses, etc.). Adding an energy project to an existing lease agreement may be surprisingly easy, especially if a Master Lease is in place with a lending institution. Governing statutes vary from state to state, the use of tax-exempt lease-purchase agreements may differ across schools, municipalities, and counties even within the same state. Public sector organizations should always consult legal counsel before entering into lease-purchase agreements.

Lease-purchase financing is not advisable when:

- state statute or charter prohibit such mechanisms from being used
- the approval process may be too difficult or politically driven
- other funds are readily available, e.g. sufficient bond funding will soon be accessible, or excess money exists in the current capital or operating budgets.

The Costs of Delay

Quantifying the costs of delaying installation of an energy-efficiency project adds a new dimension to the financial decision. State or local government officials often feel that postponing equipment upgrades until the operating or capital budget dollars are available, rather than financing the installation immediately, is a better financial decision. They reason that if internal budget dollars are used, they can completely avoid paying interest. However, the energy dollars wasted by delaying the project for one year frequently are greater than the entire financing cost for the full financing period.

This cost of delay calculation is more complicated when comparing two different financing alternatives with different interest rates and terms, but the result is no less stark. The key question becomes how long it will take the lost energy savings to consume the total savings realized from the lower interest rate financing. Energy Star's "Cash Flow Opportunity" Calculator (Excel Spreadsheet) helps quantify these alternatives.

ENERGY IN PUBLIC BUILDINGS:

Addressing Barriers of Manual Collection of Consumption Data

Understanding the energy use of public buildings is the first step to improving energy efficiency.

Tasks such as collecting current energy use information, conducting audits of the existing building systems, and establishing the state of current operations and maintenance practices are all necessary to ascertain what opportunities exist. When all the information is collected, detailed analysis determines what project opportunities are available. This analysis, which is a combination of technical engineering and financial analysis, is the critical step to find out if dollar and energy savings are real and achievable.

Unfortunately, numerous barriers prevent public agencies from gaining access to, and making effective use of, energy information. For public agencies, the primary source of energy usage information is their utility bills. However:

- There is no readily available analytical connection between utility bills, building performance, and occupant energy and water use.

- There is limited access to utility bills by the agency personnel responsible for energy management and building performance.

- Paper utility bills are not an effective energy management tool. Where schools and other agencies have developed or purchased utility bill accounting software, they are typically unable to keep up with the labor-intensive, manual entry of the utility data into the software or justify the associated cost.

Rebuild Massachusetts, in partnership with Peregrine Energy Group, is involved in the Energy Information System demonstration project to address these barriers.

The purpose of the Energy Information System Demonstration Project is to determine whether a customized, web-based energy information system can eliminate the barriers that prevent public agencies in Massachusetts from gaining access to, and making effective use of, energy information, and thus provide an easy method to enable those agencies to implement energy efficiency projects.

ENERGY WISE SCHOOLS

With the increased cost of energy, schools need to save energy costs now. Implementing energy efficiency strategies, such as lighting upgrades and space conditioning improvements typically represent the largest opportunities for energy and cost savings but take time and money to complete. The following are some strategies (with little or no cost) that schools can implement now.

Lighting:

- Simply turning off lights in occupied rooms can save eight to twenty percent of electricity cost.
- Periodic cleaning of lamps and light fixtures can save up to fifteen percent of lighting energy

Computers and Office Equipment:

- Energy Star equipment uses less energy. Go to EPA to find a list of equipment that will save money.
- EPA has software available that allows network administrators to enable power management routines for computers.

Building Envelope

- Periodically inspect doors and windows for air leaks.
- Regularly check for water leaks also.

Heating

- Proper boiler maintenance can lead to energy savings of ten to twenty percent – reduced boiler maintenance leads to greatly increased operating costs as boiler efficiency declines.

Water Heating

- Periodic maintenance on the hot water system keeps it operating efficiently and extends the life of the system.
- Install timers to shut off electric hot water tanks during period when the building is unoccupied.

Kitchen

- Schools can reduce energy consumption by preheating ovens for no more that fifteen minutes.

Vending Machines

- An energy control device for vending machines can save as much as forty-seven percent with a payback of less than two years.

For more information about controlling energy cost read School Operation and Maintenance: Best Practices for Controlling Energy Costs

25 YEARS OF NATIONAL ENERGY EDUCATION DEVELOPMENT

NEED's mission is to promote energy awareness through effective networks of students and educators, along with business, government, and community leaders who design and deliver objective, multisided energy education programs. NEED designs curriculum materials to teach the science of energy and has experts review its materials for scientific accuracy, comprehensiveness, objectivity, educational soundness, and effectiveness. Students, educators, sponsors, and partners evaluate materials, training programs, and new activities. NEED also provides a variety of assessment techniques and tools for measuring student knowledge and performance.

The curricula include lessons about where energy comes from, how it is used, and its effects on the environment and the economy. The program also educates students about energy efficiency and conservation. Materials are geared toward students in kindergarten through high school and are correlated to the National Science Education Content Standards and many state standards. Educators who use NEED materials report that their students score better on end-of-grade testing, are more actively engaged in their own education, and develop leadership skills.

In a NEED science class, energy is integrated with hands-on energy experiments. The students in a social studies class may consider land use and energy policy. Language arts students may write persuasive essays that argue the financial benefits of adopting energy conservation and efficiency measures. Technology students work with hydrogen fuel cells. In the career center, students consider the energy industry as a viable option for employment.

NEED educators see their students' energy knowledge soar and their families' energy awareness increase. NEED is at the forefront of energy challenges and opportunities — it brings the ever-changing world of energy to the schoolroom desk. See NEED's curriculum guides.

NEED began in 1980 with a Congressional resolution and a proclamation by President Jimmy Carter. The U.S. Department of Energy (DOE) provided some initial funding through the State Energy Conservation Program, a predecessor of the State Energy Program (SEP). From the beginning, NEED programs dealt with all types of energy and with issues that surround the exploration, production, use, and conservation of energy.

Today NEED is a nonprofit organization that serves teachers and students in 45 states and territories, thanks largely to support from SEP and many state energy offices.

NEED programs in Massachusetts continue to expand on the successful Cape Light Compact and Cape Cod Cooperative Extension NEED partnership. NEED workshops are provided to interested schools and curriculum materials aligned to the Massachusetts curriculum framework provide educators with tools to reduce energy consumption in classrooms and to meet their science and social studies needs.

For more information go to: www.need.org or email info@need.org

Source: Feature article in the September-October 2005 edition of the State Energy Program's bimonthly newsletter, *Conservation Update*.

by Mary E. Spruill

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